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(54) **Integrated circuit for storage and retrieval of multiple digital bits per nonvolatile memory cell**

(57) An integrated circuit storing multiple bits per memory cell is described. The amount of charge stored in a memory cell corresponds to the multiple bits. The cells are organised into blocks each with reference and data memory cells. Reference voltage levels (REFA0-REFA15, REFB0-REFB15) are generated so

programming circuits can simultaneously set voltages in the data memory cells corresponding to data bits with respect to a first set of reference voltage levels. Reading circuits compare the voltages set in the data memory cells with respect to a second set of reference voltage levels programmed in the reference memory cells to determine the data bits.

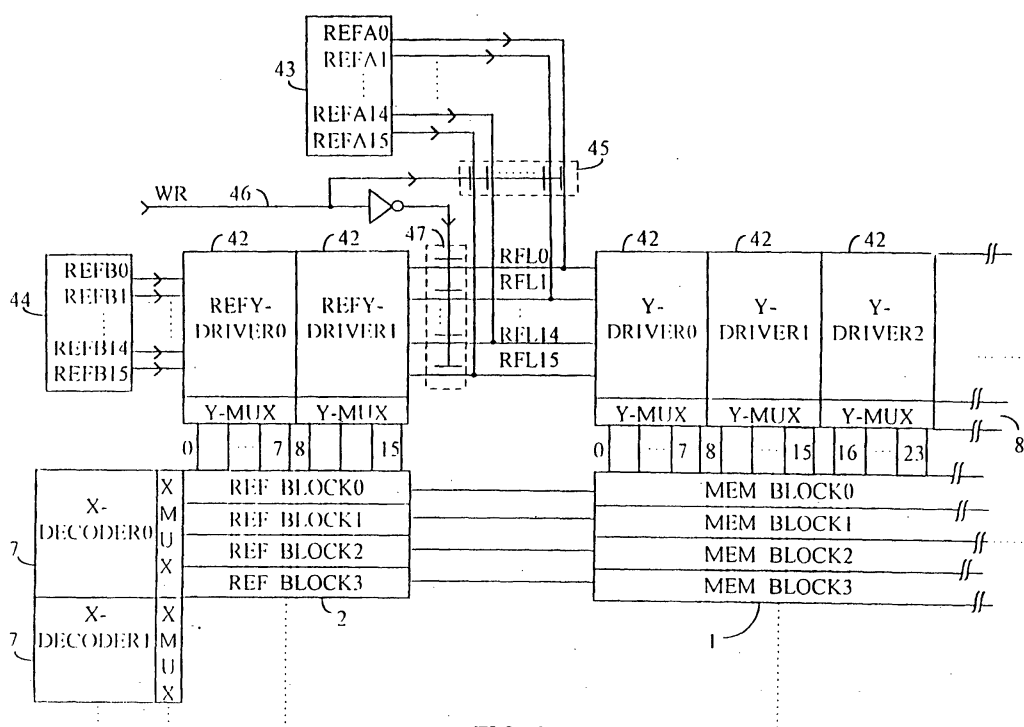


FIG. 3

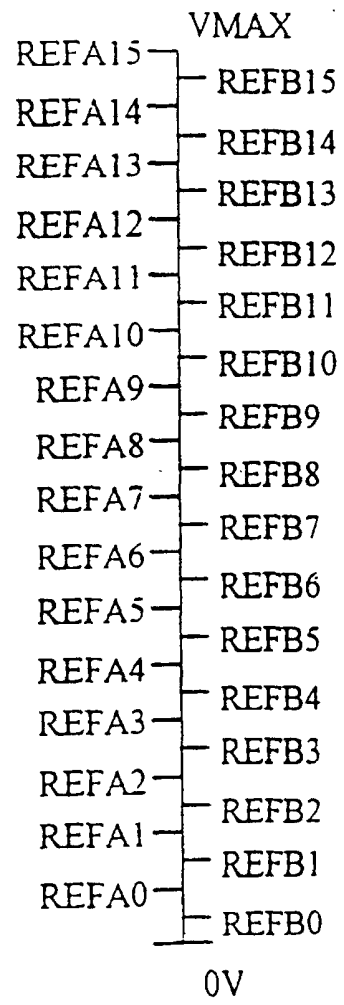


FIG. 10



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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 90 12400 A (SUNDISK CORP) 18 October 1990 (1990-10-18) * page 5, line 5 - page 6, line 2 * * page 20, line 15 - line 34 * * page 23, line 16 - page 24, line 19 * * page 30, line 1 - line 8 * -----	1-8	G11C7/00 G11C11/56 G11C7/10
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			G11C
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		1 April 2003	Colling, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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The members are as contained in the European Patent Office EDP file on
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01-04-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
WO 9012400	A	18-10-1990	DE	69030959 D1	24-07-1997
			DE	69030959 T2	27-11-1997
			DE	69033023 D1	29-04-1999
			DE	69033023 T2	02-09-1999
			DE	69033862 D1	20-12-2001
			DE	69033862 T2	13-06-2002
			DE	69033927 D1	11-04-2002
			DE	69033927 T2	12-09-2002
			EP	0539358 A1	05-05-1993
			EP	0774759 A1	21-05-1997
			EP	0778582 A2	11-06-1997
			EP	0756287 A2	29-01-1997
			JP	4507320 T	17-12-1992
			WO	9012400 A1	18-10-1990
			US	5172338 A	15-12-1992
			US	5163021 A	10-11-1992
